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MCRD PARRIS ISLAND
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PROPOSED PLAN FOR WATER, SOIL, AND SEDIMENT REMEDIAL ACTION SITE 12 SOLID WASTE MANAGEMENT UNIT 10 JERICHO ISLAND DISPOSAL AREA WITH TRANSMITTAL

MCRD PARRIS ISLAND SC

7/21/2005

TETRA TECH NUS, INC

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PITT-07-5-036

July 21, 2005

Project Number N4445

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Mr. Art Sanford (Code ES32)
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0334

Subject: SWMU 12 Proposed Plan
MCRD Parris Island, South Carolina

Dear Mr. Sanford:

Please find enclosed two copies of the subject report.

I am forwarding 75 copies to Tim Harrington for distribution to the depot mailing list, which we assume includes all members of the Partnering Team. If any additional copies are necessary, or if additional distributions must be made, please let me know and we will comply as soon as possible.

If you have any questions or comments, please call me at (412) 921-8216.

Sincerely,

Mark Sladic, P.E.
Task Order Manager

MS/kf
Enclosure

cc: Mr. T. Harrington, MCRD Parris Island (75 copies)
Ms. Debra M. Humbert, TtNUS (w/o attachment)
Mr. M. Perry/File N4445, TtNUS (one copy)

Proposed Plan for Waste, Soil, and Sediment Remedial Action at Site 12/SWMU 10 - Jericho Island Disposal Area

Marine Corps Recruit Depot Parris Island, South Carolina

Introduction

This document presents the Proposed Plan for Site 12/ Solid Waste Management Unit (SWMU) 10 at the Marine Corps Recruit Depot (MCRD) Parris Island, South Carolina. (For the remainder of this document, Site 12/ SWMU 10 will be referred to as Site 12).

Site 12 was reportedly used from 1955 to 1968 as a waste disposal area for local residents; however, no organized landfill operations were reported to have occurred at the site. As a result of these disposal activities, potential risks to human health and the environment exist through exposure to surface debris and contaminated soil, sediment, and groundwater. This Proposed Plan summarizes results of investigations conducted to characterize the nature and extent of contamination at Site 12. Additionally, this Proposed Plan discusses remedial alternatives considered for the clean up of Site 12 and summarizes the evaluation of these alternatives. Remedial alternatives considered for Site 12 include a no-action alternative (Alternative 1), three containment options (Alternatives 2a, 2b, and 3), and an excavation alternative where all contaminated site material is transported to an approved disposal facility (Alternative 4). Since development in the feasibility study/corrective measures study (FS/CMS), Alternative 4 has been modified to as described herein. It is therefore addressed as Modified Alternative 4 whenever necessary to differentiate it from original Alternative 4.

This Proposed Plan was developed by the MCRD Parris Island Partnering Team, which includes representatives from the Department of the Navy (Navy), Marine Corps, United States Environmental Protection Agency (U.S. EPA), and South Carolina Department of Health and Environmental Control (SCDHEC).

This document was developed in accordance with, and fulfills, Section 117(a) of the Comprehensive

The Remedial Action Proposal

The preferred Alternative presented in this Proposed Plan is Modified Alternative 4. This remedial alternative consists of the following components:

- Excavate three surface debris piles present on Jericho Island. The first foot of soil and sediment underlying these debris piles would also be excavated.
- Excavate two areas of soil containing concentrations of polynuclear aromatic hydrocarbons (PAHs) greater than clean-up goals for protection of human and ecological receptors.
- Excavate one area of sediment containing concentrations of inorganics greater than clean-up goals for protection of human and ecological receptors.
- Excavation of debris, soils, and sediment in the causeway.
- Excavation of the causeway that connects the northern end of Jericho Island to the mainland.
- Transport excavated soils, sediments, and surface debris to an approved off-site disposal facility.
- Perform verification sampling and laboratory analysis and a post-removal study to ensure that material with concentrations greater than the clean-up goals (ecological and human health remedial goal options [RGOs]) are removed.
- Abandon all existing monitoring wells present on Jericho Island.
- Restore excavated areas and disturbed wetlands.

In accordance with CERCLA Section 117, this document summarizes the Proposed Plan for Site 12 at MCRD Parris Island. For more detailed information, please consult the Administrative Record File located in the information repository at the Beaufort County Public Library Headquarters (311 Scott Street, Beaufort, South Carolina 29902).

Environmental Response, Compensation, and Liability Act (CERCLA) and applicable provisions of the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) [40 CFR 300.430(f)(2)]. This Plan highlights key information from the remedial investigation/ Resource Conservation and Recovery Act (RCRA) facility investigation (RI/RFI) and FS/CMS performed for Site 12 but is not a substitute for the these reports. More detailed information is located at the information repository for Site 12 in the Administrative Record file. Following the issuance of this document, the public is invited to review the Administrative Record File and comment on the Proposed Plan. As the lead agency, the Navy is required to publish the Proposed Plan to fulfill the public participation requirements of CERCLA and the NCP. The Navy and EPA, in consultation with the State, will select a final remedy for Site 12 after all public comments have been addressed. Please note that the Navy, in consultation with the U.S. EPA and SCDHEC, may modify the Preferred Alternative of this Proposed Plan or select another response action based on any new information that may become available during the public comment period.

As the lead agency, the Navy is accepting formal public comments on the Proposed Plan from July 29, 2005 to September 27, 2005. The indicated dates encompass a 60-day public comment period. You do not have to be a technical expert to comment. If you have a concern or preference, the Partnering Team wants to hear it before making a final decision. To comment formally, please offer oral comments during the comment portion of the public meeting, or send written comments, emailed or postmarked no later than September 27, 2005, to

Commanding General
Marine Corps Recruit Depot
Attn: Timothy J. Harrington, NREAO
P.O. Box 19003
Parris Island, SC 29905-9003
Tel: 843-228-3423
email: timothy.j.harrington@usmc.mil

AND

South Carolina Department of Health and Environmental Control
Division Director John Litton
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201
Tel: 803-896-4172
email: littonjt@dhec.sc.gov

Facility Description

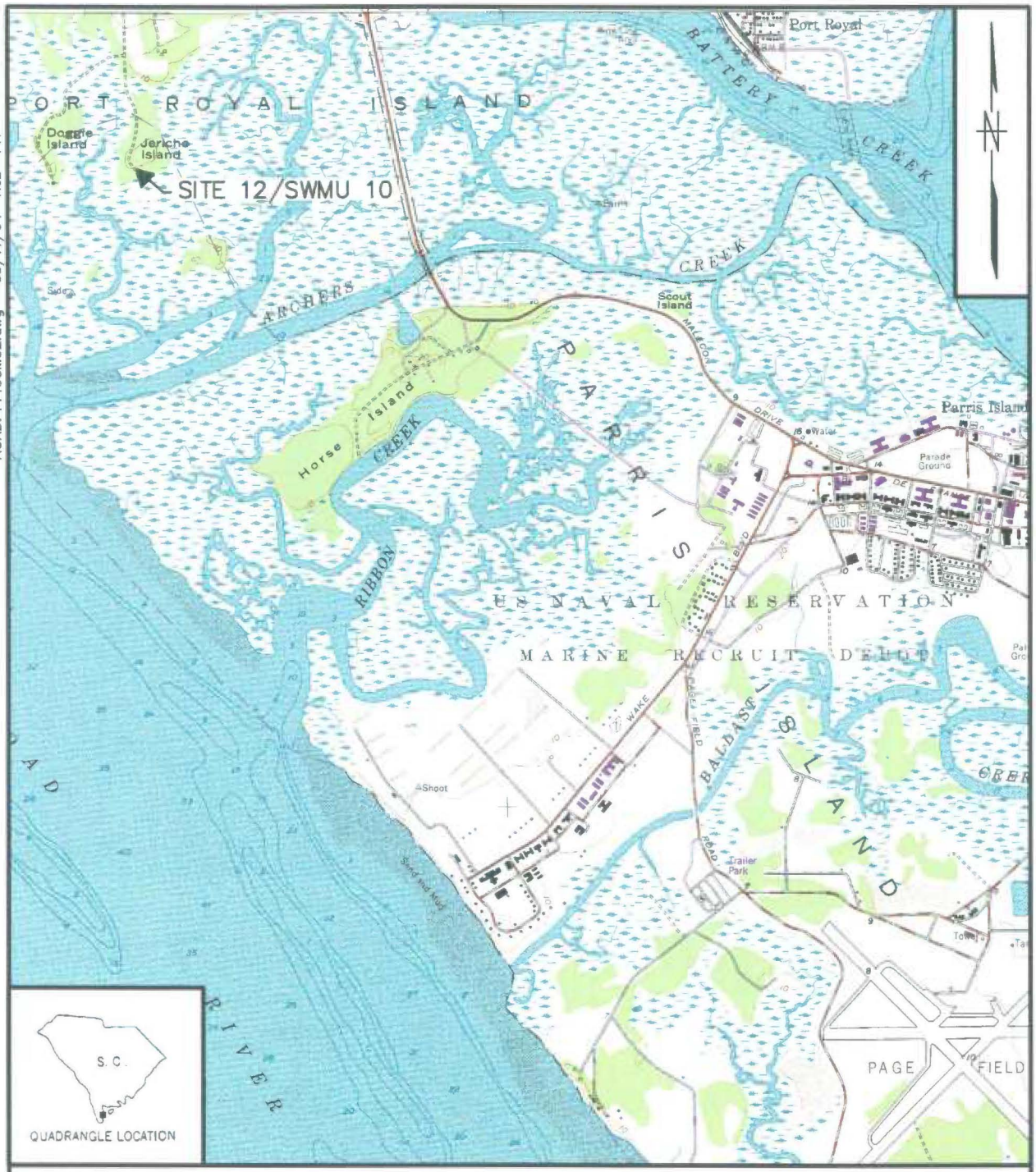
MCRD Parris Island, South Carolina (see Figure 1) is the reception and recruit training facility for the Marine Corps for enlisted men from states east of the Mississippi River and for enlisted women nationwide. The Depot is located along the southern coast of South Carolina, within Beaufort County, approximately 1 mile south of the city of Port Royal and 3 miles south of the city of Beaufort, and occupies an area of approximately 8,047 acres. MCRD Parris Island was added to the U.S. EPA's National Priorities List (NPL) in 1994.

Site Background and Characteristics

Jericho Island (Site 12) is approximately 25 acres in size and is located northwest of Horse Island, as shown on Figure 1. The island was acquired by the Navy in 1968 to comply with the limited distance arc required for MCRD Parris Island's rifle range. Site 12 was reportedly used from 1955 to 1968 as a waste disposal area for local residents; however, no organized landfill operations were reported to have occurred at the site. Disposed waste/ surface debris consisted of routine domestic refuse including small metal cans, beer and soda bottles, hubcaps, tires, buckets, cinderblocks, rusted metal 5-gallon cans, sheet metal, paper, plastic, and wood. The site has an irregular, undulating surface due to the random scattering of surface debris piles, ranging up to approximately 30 feet in diameter and 5 feet in height. After MCRD Parris Island acquired Site 12, the area was no longer used for waste disposal purposes.

As shown on Figure 2, three surface debris piles are present on Jericho Island. Two of the surface debris piles are located in the upland portion of the island (one in the west-central and one in the southern portion of the island). The other surface debris pile is located at the southern edge of the island and extends into the adjacent sediment. A drinking water well on the east-central portion of Jericho Island, installed by a previous owner, was abandoned per SCDHEC requirements in April, 2005.

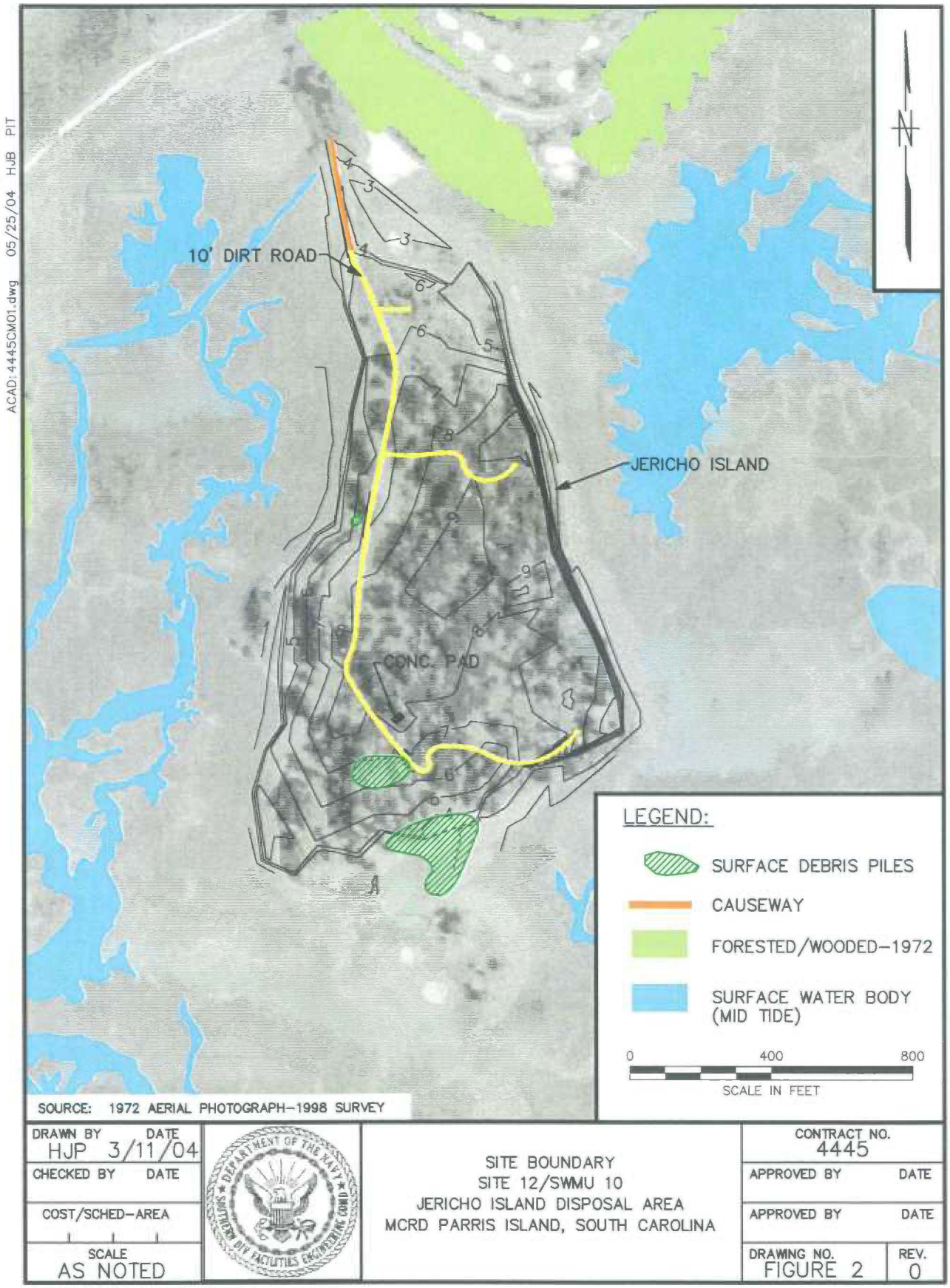
A causeway (a raised way across wet ground or water) was constructed from the mainland to the northern end of Jericho Island for access purposes. This causeway was constructed with soil commingled with waste material. The date of construction of the causeway is unknown. Since the completion of the Site 12 FS, the MCRD Parris Island Partnering Team has decided to include excavation of the causeway as part of this proposed plan.



SOURCE: USGS 7.5 MINUTE PARRIS ISLAND QUADRANGLE, 1956. PHOTOREVISED 1979.

DRAWN BY HJB DATE 3/11/04	DEPOT/SITE LOCATION MAP JERICHO ISLAND DISPOSAL AREA MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 4445	
CHECKED BY DATE		APPROVED BY DATE	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 1	REV. 0

FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98


ACAD: 4445CM01.dwg 05/25/04 HJB PIT
10' DIRT ROAD
JERICHO ISLAND
CONC. PAD
N
LEGEND:
SURFACE DEBRIS PILES
CAUSEWAY
FORESTED/WOODED-1972
SURFACE WATER BODY (MID TIDE)
0
400
800
SCALE IN FEET
SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY
DRAWN BY DATE
HJP 3/11/04
CHECKED BY DATE
COST/SCHED-AREA
SCALE
AS NOTED
SITE BOUNDARY
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
CONTRACT NO.
4445
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO.
FIGURE 2
REV.
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FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

Scope and Role of the Proposed Action

Fifty-five sites are being investigated under the Installation Restoration (IR) Program. This Proposed Plan addresses Site 12; the remaining 54 sites are in the process of being addressed and will be addressed separately.

Based on the risk assessment undertaken during the study of Site 12, wastes, soils, sediments, and groundwater at Site 12 currently pose a risk to human health and the environment. As a result, a remedial action is planned at Site 12 to reduce these risks.

As part of remedial activities, source materials (three surface debris piles and their underlying soil and sediment) would be excavated and transported to an approved off-site disposal facility. Similarly, soils containing concentrations of PAHs and sediments containing concentrations of inorganics greater than their respective clean-up goals would be excavated and transported to an off-site disposal facility. Likewise, the causeway connecting the northern portion of Jericho Island to the mainland would be removed and disposed. These activities would eliminate human and ecological exposure to waste and contaminated soil and sediment currently present at Site 12.

Potential human risks from exposure to groundwater would be indirectly addressed through excavation actions taken to address waste and contaminated soil and sediment. Excavation activities would remove source materials thereby effectively eliminating the transport of contaminants to groundwater. Moreover, risk from potential human exposure to groundwater is anticipated to be negligible because it is unlikely that humans will drink Site 12 groundwater. Under a hypothetical residential scenario, ingestion of groundwater by future residents results in unacceptable cancer and noncancer risks. However, groundwater at Site 12 is not suitable for drinking due to its high salt content and total dissolved solids (see FS/CMS page 3-10, 5th par.). In addition, groundwater is not anticipated to be used by residents at Site 12 because the site is currently used for industrial purposes and is planned for such use into the foreseeable future. Groundwater does not pose unacceptable risks to ecological receptors.

Although human and ecological risks from exposure to surface water are within acceptable limits, the proposed remedy will also effectively eliminate the possibility of future transport of contaminants from soil or sediment to surface water.

The role of a Proposed Plan is to present the preferred alternative to the public. The Proposed Plan briefly summarizes the alternatives that were studied, highlighting the key factors that led to the selection of the preferred alternative.

A Closer Look at the Proposed Remedy

Modified Alternative 4 was developed by the MCRD Parris Island Partnering Team after the completion of the Site 12 FS/CMS. Building on the components of Alternative 4, Modified Alternative 4 also includes excavation of the causeway (connecting to the northern end of the land mass on Figure 3).

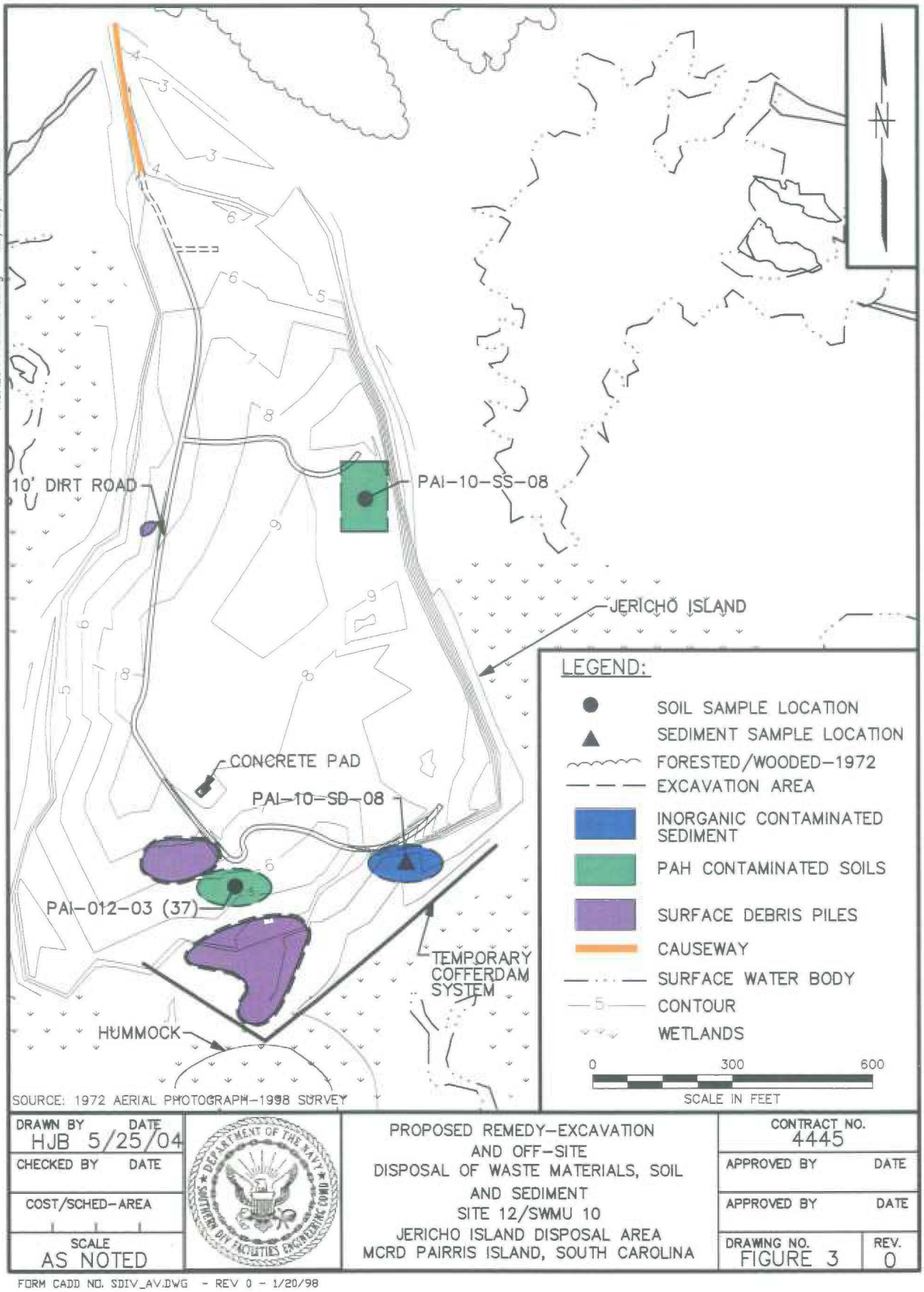
The causeway (a raised way across wet ground or water) connects the northern end of Jericho Island to the mainland and was constructed with soil commingled with waste material. The causeway is approximately 350 feet long, 15 feet wide, and 3 feet high. The date of construction of the causeway is unknown.

As part of the causeway excavation, soil and waste that comprise the causeway and 1 foot of the causeway's underlying sediment would be excavated and disposed at an approved waste disposal facility. Approximately 800 cubic yards of soil, sediment, and waste would be removed. All other activities described as part of Alternative 4 would be performed as part of Modified Alternative 4

The following text explains in further detail the proposed remedy (modified Alternative 4). This alternative is also illustrated in Figure 3.

1. **Excavate Surface Debris, Soil and Sediment**
   First and foremost, the three surface debris piles located on Jericho Island and their underlying soil and sediment (approximately 2,300 cubic yards of material) would be excavated. Furthermore, approximately 1,700 cubic yards of PAH-contaminated soil in the vicinity of sample locations PAI-10-SS-08 and PAI-012-03 (37) would be excavated. Inorganic-contaminated sediments (approximately 370 cubic yards) in the vicinity of sediment sample PAI-10-SD-08 would also be removed. Lastly, the causeway connecting Jericho Island to the mainland would be excavated. Approximately 800 additional cubic yards of soil, sediment, and waste would be excavated as part of the causeway excavation in order to prevent access to Jericho Island by unauthorized persons.

   Verification sampling and laboratory analysis would be performed to determine whether excavation activities achieved clean-up goals (RGOs) for the protection of human and ecological receptors. A post-removal assessment would also be performed. The ecological and human health RGOs would be used to confirm that any remaining materials would not


ACAD: 4445CM04.dwg 05/25/04 HJB PIT
10' DIRT ROAD
PAI-10-SS-08
JERICHO ISLAND
CONCRETE PAD
PAI-10-SD-08
PAI-012-03 (37)
TEMPORARY COFFERDAM SYSTEM
HUMMOCK
SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY
LEGEND:
SOIL SAMPLE LOCATION
SEDIMENT SAMPLE LOCATION
FORESTED/WOODED-1972
EXCAVATION AREA
INORGANIC CONTAMINATED SEDIMENT
PAH CONTAMINATED SOILS
SURFACE DEBRIS PILES
CAUSEWAY
SURFACE WATER BODY
CONTOUR
WETLANDS
0
300
600
SCALE IN FEET
DRAWN BY HJB DATE 5/25/04
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED
DEPARTMENT OF THE NAVY
SOUTHERN DIV FACILITIES ENGINEERING COMMD
PROPOSED REMEDY-EXCAVATION AND OFF-SITE DISPOSAL OF WASTE MATERIALS, SOIL AND SEDIMENT
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PAIRRIS ISLAND, SOUTH CAROLINA
CONTRACT NO. 4445
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3
REV. 0
FORM CADD NO. SDIV_AV.DWG - REV 0 - 1/20/98

pose a risk to receptors. The evaluation would be based on both individual sample results and an overall evaluation of the remaining media.

To allow for easier excavation, a temporary cofferdam system may be installed along the southern portion of the island to eliminate daily flooding due to the tidal cycle. The cofferdam system would be removed after all excavation activities are completed. Moreover, approximately 1.6 acres of wetlands would be restored upon completion of excavation activities, pending the appropriate wetlands permits being granted upon application by Navy/MCRD. All existing monitoring wells located on Jericho Island would also be properly abandoned.

2. **Transport Excavated Material to an Approved Disposal Facility**
   All excavated surface debris, soil, and sediment would be loaded and transported to an approved off-site disposal facility. Prior to loading and transport, excavated sediment and wet surface debris would be dewatered. Additionally, all excavated material would be characterized to determine the appropriate disposal facility. Approximately 650 truck loads (10-ton truck loads) would be required to transport this material.

3. **Restoration**
   The surface debris piles and PAH soil excavation areas would be restored to match original surface levels and would then be vegetated. Areas where sediment is removed from the marsh would be restored by filling with a clean sand material and re-vegetated. The sediment in the area would be temporarily stabilized to minimize erosion. The causeway area will be reestablished as a salt marsh.

   Alternatives for the salt marsh restoration may be considered that would be enacted based on inadequate vegetative establishment or re-establishment of soil conditions. Also, if verification testing indicates that residual sediment contamination remains, covering with soils may be considered to provide a barrier to reduce contact with contaminated sediment.

Summary of Site Risks

The RI/RFI characterized the nature and extent of contamination in areas where the potential for off-site migration of contamination exists from past waste disposal at Site 12. Media that were investigated during the RI/RFI consisted of surface soil, sediment, groundwater, and surface water. The RI/RFI also characterized sediment in the vicinity of the surface debris piles (referred to as sediment waste samples).

During the RI/RFI, potential environmental risks associated with this site were evaluated for human health and ecological receptors in accordance with U.S. EPA guidelines. The risk assessments considered the current land use at Site 12, which is industrial, and a hypothetical unrestricted future land use. Site groundwater is not currently used as a potable water supply and is not expected to be used as a potable water supply due to the groundwater's high salt content and total dissolved solids (see FS/CMS page 3-10, par 5) and the site's current and expected future use as a buffer zone to comply with the limited distance arc required for MCRD Parris Island's rifle range. The risk estimates were based on receptor (e.g., human, osprey, raccoon), duration of exposure (e.g., 1 day per week), pathway (e.g., ingestion of groundwater or direct contact with soil), ingestion rates (pounds per day), and representative concentration of contaminants. The estimated risks were then compared to established criteria for evaluation.

Human Health Risk Assessment

Maximum detected concentrations at Site 12 were compared to risk-based and health-based screening criteria. If the maximum concentration exceeded any one of the screening criteria, that chemical was retained as a chemical of potential concern (COPC). COPCs identified for Site 12 are presented in Table 1. The risk assessment then evaluated potential exposure pathways including direct contact and ingestion of soil, groundwater, surface water, and sediment, and inhalation of groundwater vapors. Potential receptors consisted of construction workers, adolescent trespassers, adolescent/adult recreational users, and potential future residents. Recreational users are individuals who wade within the waters adjacent to Site 12.

Risk estimates developed in the human health risk assessment were divided into carcinogenic (cancer) and noncarcinogenic (noncancer) concerns. For carcinogenic risks, a range of 1 in 10,000 (1.0E-04) to 1 in 1,000,000 (1.0E-06) incremental lifetime cancer risk (ILCR) is considered to be acceptable by the U.S. EPA. For noncarcinogenic concerns, the U.S. EPA threshold value Hazard Index (HI) is 1.0.

As shown in Table 2, ingestion of soil and groundwater by hypothetical future residents were shown to result in estimated cancer risks that exceed U.S. EPA's acceptable range of 1.0E-04 to 1.0E-06. Arsenic concentrations are the main risk contributors.

TABLE 1

CHEMICALS RETAINED AS HUMAN HEALTH CHEMICALS OF POTENTIAL CONCERN (COPCs)
SITE 12- JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Surface Soil	Groundwater	Surface Water	Sediment	Sediment Waste	Soil to Air	Soil to Groundwater
Volatile Organic Compounds							
Acetone		X					
Chloroform		X					
Semivolatile Organic Compounds							
Benzo(a)pyrene	X						
Bis(2-Ethylhexyl)phthalate			X				
Pesticides/PCBs							
Aroclor-1254					X		
Inorganics							
Aluminum		X	X	X			
Antimony	X			X	X		
Arsenic	X	X	X	X	X		
Cadmium		X			X		
Copper					X		
Iron	X	X	X	X	X		
Lead	X				X		
Manganese	X	X	X	X	X		
Nickel				X			
Thallium		X					
Vanadium			X	X			

Notes
X - Indicates chemical was retained as a human health COPC.

TABLE 2

SUMMARY OF CANCER RISKS AND HAZARD INDICES
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$	Chemicals with Cancer Risks $>10^{-6}$	Hazard Index	Chemicals with HI > 1
Construction Worker	Soil	Ingestion	2.6E-06	--	--	Arsenic	1.3	--
		Dermal Contact	8.7E-07	--	--	--	0.2	--
		Total	3.5E-06	--	--	Arsenic	1.4	--
	Groundwater	Dermal Contact	3.1E-08	--	--	--	0.1	--
	Sediment	Ingestion	7.9E-08	--	--	--	0.1	--
		Dermal Contact	2.5E-08	--	--	--	0.0	--
		Total	1.0E-07	--	--	--	0.1	--
	Surface Water	Ingestion	1.0E-08	--	--	--	0.0	--
		Dermal Contact	2.3E-08	--	--	--	0.0	--
		Total	3.4E-08	--	--	--	0.0	--
	Sediment Waste	Ingestion	6.9E-07	--	--	--	1.0	--
		Dermal Contact	1.4E-07	--	--	--	0.1	--
		Total	8.3E-07	--	--	--	1.1	--
		Total All Media	4.5E-06				2.7	
Adolescent Trespasser	Soil	Ingestion	3.0E-06	--	--	Arsenic	0.15	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.03	--
		Total	4.9E-06	--	--	Arsenic	0.18	--
	Sediment	Ingestion	5.5E-07	--	--	--	0.04	--
		Dermal Contact	3.1E-07	--	--	--	0.008	--
		Total	8.5E-07	--	--	--	0.04	--
	Surface Water	Ingestion	1.1E-07	--	--	--	0.004	--
		Dermal Contact	6.1E-07	--	--	--	0.03	--
		Total	7.2E-07	--	--	--	0.03	--
	Sediment Waste	Ingestion	4.8E-06	--	--	Aroclor-1254, Arsenic	0.69	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.08	--
		Total	6.6E-06	--	--	Aroclor-1254, Arsenic	0.76	--
		Total All Media	1.3E-05				1.0	
Adolescent Recreational User	Soil	Ingestion	3.0E-06	--	--	Arsenic	0.15	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.03	--
		Total	4.9E-06	--	--	Arsenic	0.18	--
	Sediment	Ingestion	5.5E-07	--	--	--	0.04	--
		Dermal Contact	3.1E-07	--	--	--	0.008	--
		Total	8.5E-07	--	--	--	0.04	--
	Surface Water	Ingestion	1.1E-07	--	--	--	0.004	--
		Dermal Contact	6.1E-07	--	--	--	0.03	--
		Total	7.2E-07	--	--	--	0.03	--
	Sediment Waste	Ingestion	4.8E-06	--	--	Aroclor-1254, Arsenic	0.69	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.08	--
		Total	6.6E-06	--	--	Aroclor-1254, Arsenic	0.76	--
		Total All Media	1.3E-05				1.0	
Adult Recreational User	Soil	Ingestion	1.2E-06	--	--	Arsenic	0.09	--
		Dermal Contact	1.0E-06	--	--	--	0.03	--
		Total	2.2E-06	--	--	Arsenic	0.13	--
	Sediment	Ingestion	2.1E-07	--	--	--	0.02	--
		Dermal Contact	1.8E-07	--	--	--	0.008	--
		Total	3.9E-07	--	--	--	0.03	--
	Surface Water	Ingestion	4.2E-08	--	--	--	0.002	--
		Dermal Contact	3.5E-07	--	--	--	0.03	--
		Total	3.9E-07	--	--	--	0.03	--
	Sediment Waste	Ingestion	1.9E-06	--	--	Arsenic	0.44	--
		Dermal Contact	1.0E-06	--	--	--	0.07	--
		Total	2.9E-06	--	--	Arsenic	0.51	--
		Total All Media	5.9E-06				0.70	
Child Resident	Soil	Ingestion	8.5E-05	--	Arsenic	PAHs	6.9	Arsenic, Iron
		Dermal Contact	1.3E-05	--	Arsenic	PAHs	0.41	--
		Total	9.9E-05	--	Arsenic	PAHs	7.3	Arsenic, Iron
	Groundwater	Ingestion	2.9E-04	Arsenic	--	--	42	Arsenic, Iron, Manganese, Thallium
		Dermal Contact	1.2E-06	--	--	Arsenic	0.69	--
		Inhalation	1.5E-07	--	--	--	0.38	--
		Total	2.9E-04	Arsenic	--	--	43	Arsenic, Cadmium, Iron, Manganese, Thallium
	Sediment	Ingestion	2.0E-06	--	--	Arsenic	0.21	--
		Dermal Contact	2.9E-07	--	--	--	0.01	--
		Total	2.3E-06	--	--	Arsenic	0.23	--
	Surface Water	Ingestion	2.0E-07	--	--	--	0.01	--
		Dermal Contact	5.7E-07	--	--	--	0.05	--
		Total	7.7E-07	--	--	--	0.06	--
	Sediment Waste	Ingestion	1.7E-05	--	Arsenic	Aroclor-1254	4.1	Aroclor-1254, Iron
		Dermal Contact	1.7E-06	--	--	Arsenic	0.12	--
		Total	1.9E-05	--	Arsenic	Aroclor-1254	4.2	Aroclor-1254, Iron
		Total All Media	4.1E-04				55	

TABLE 2

SUMMARY OF CANCER RISKS AND HAZARD INDICES
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$	Chemicals with Cancer Risks $>10^{-6}$	Hazard Index	Chemicals with HI > 1
Adult Resident	Soil	Ingestion	3.6E-05	--	Arsenic	--	0.74	--
		Dermal Contact	1.1E-05	--	Arsenic	--	0.09	--
		Total	4.8E-05	--	Arsenic	PAHs	0.82	--
	Groundwater	Ingestion	4.9E-04	Arsenic	--	--	71	Arsenic, Cadmium, Iron, Manganese, Thallium
		Dermal Contact	2.8E-06	--	--	Arsenic	1.6	--
		Inhalation	2.5E-07	--	--	--	0.63	--
		Total	4.9E-04	Arsenic	--	--	73	Acetone, Arsenic, Cadmium, Iron, Manganese, Thallium
	Sediment	Ingestion	8.5E-07	--	--	--	0.02	--
		Dermal Contact	2.5E-07	--	--	--	0.003	--
		Total	1.1E-06	--	--	Arsenic	0.03	--
	Surface Water	Ingestion	1.7E-07	--	--	--	0.002	--
		Dermal Contact	1.4E-06	--	--	Bis(2-ethylhexyl)phthalate	0.03	--
		Total	1.6E-06	--	--	Bis(2-ethylhexyl)phthalate	0.03	--
	Sediment Waste	Ingestion	7.4E-06	--	--	Aroclor-1254, Arsenic	0.44	--
		Dermal Contact	1.4E-06	--	--	Arsenic	0.03	--
		Total	8.8E-06	--	--	Aroclor-1254, Arsenic	0.47	--
		Total All Media	5.5E-04				74	
Lifelong Resident	Soil	Ingestion	1.2E-04	Arsenic	--	PAHs	NA	--
		Dermal Contact	2.5E-05	--	Arsenic	PAHs	NA	--
		Total	1.5E-04	Arsenic	--	PAHs	NA	--
	Groundwater	Ingestion	7.8E-04	Arsenic	--	--	NA	--
		Dermal Contact	4.0E-06	--	--	Arsenic	NA	--
		Inhalation	4.0E-07	--	--	--	NA	--
		Total	7.8E-04	Arsenic	--	--	NA	--
	Sediment	Ingestion	2.8E-06	--	--	Arsenic	NA	--
		Dermal Contact	5.4E-07	--	--	--	NA	--
		Total	3.4E-06	--	--	Arsenic	NA	--
	Surface Water	Ingestion	3.7E-07	--	--	--	NA	--
		Dermal Contact	2.0E-06	--	--	Bis(2-ethylhexyl)phthalate	NA	--
		Total	2.3E-06	--	--	Bis(2-ethylhexyl)phthalate	NA	--
	Sediment Waste	Ingestion	2.5E-05	--	Arsenic	Aroclor-1254	NA	--
		Dermal Contact	3.1E-06	--	--	Arsenic	NA	--
		Total	2.8E-05	--	Arsenic	Aroclor-1254	NA	--
		Total All Media	9.6E-04				NA	

- Indicates that the chemical exceeds the U.S. EPA's acceptable carcinogenic risk range of 1 in 10,000 (1.0E-04) to 1 in 1,000,000 (1.0E-06) or the U.S. EPA threshold value Hazard Index of 1.0.

TABLE 3

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Surface Soil	Sediment	Sediment Waste	Groundwater	Surface Water
Volatile Organic Compounds					
2-Butanone			X		X
2-Hexanone	X		X		
4-Methyl-2-pentanone	X		X		
Acetone	X		X	X	X
Carbon disulfide	X		X	X	X
Chloroform	X				
Chloromethane	X				
Toluene			X		
Trichloroethene				X	
Xylenes, Total			X		
Semivolatile Organic Compounds					
2-Methylnaphthalene	X				
Acenaphthene			X		
Acenaphthylene	X				
Benzo(a)anthracene	X				
Benzo(a)pyrene	X				
Benzo(b)fluoranthene	X		X		
Benzo(k)fluoranthene	X				
Benzoic acid				X	
Bis(2-ethylhexyl)phthalate	X	X	X		X
Chrysene	X				
Di-n-octyl phthalate		X			
Fluoranthene	X				
Fluorene	X				
Indeno(1,2,3-cd)pyrene			X		
Naphthalene	X				
Pentachlorophenol	X		X		
Phenanthrene	X				
Pyrene	X				
Total PAHs	X	X			
Pesticides/PCBs					
4,4'-DDE	X	X			
4,4'-DDT		X	X		
alpha-BHC		X			
Aroclor-1254		X			
Alpha-chlordane			X		
Gamma-chlordane			X		
Dieldrin		X			
Endrin		X			
Methoxychlor			X		
Inorganics					
Aluminum	X	X	X	X	X
Antimony	X	X	X		
Arsenic	X	X	X		
Barium		X	X	X	X
Beryllium			X		
Cadmium	X	X	X		
Chromium	X	X	X		
Cobalt		X	X	X	
Copper	X	X	X	X	
Iron	X	X	X	X	X
Lead	X	X	X		
Manganese	X	X	X	X	X
Mercury	X		X		
Nickel		X	X	X	
Selenium		X	X		
Silver	X	X			
Thallium			X		X
Vanadium	X	X	X	X	X
Zinc		X	X		

Notes
X - Indicates chemical was retained as an ecological COPC.

Ingestion of sediment waste, soil, and groundwater by hypothetical future residents also resulted in HIs greater than 1.0. Inorganic and Aroclor-1254 concentrations were the main contributors to this noncarcinogenic risk.

For groundwater, calculated risks were very conservative based on the limited occurrences of some COCs, background levels of other COCs, etc. (see FS/CMS page 2-7) as well as the unlikely use of the groundwater as drinking water.

Under other exposure scenarios (construction worker, adolescent trespasser, adolescent recreational user, adult recreational user), cancer and non-cancer risks were within acceptable ranges.

Ecological Risk Assessment

For ecological receptors, potential impacts were considered for benthic macroinvertebrates (e.g., insect larvae), aquatic receptors (e.g., mink, heron, mummichog, red drum, and osprey), and terrestrial receptors (e.g., shrew, mouse, robin, hawk, fox, and woodcock). To evaluate potential ecological risk, a range of screening criteria is available, from very conservative criteria to those that take into account site-specific conditions. The initial screening criteria are based on the U.S. EPA Region 4 ecological screening values for soil, sediment, and surface water. These values are considered to be protective of all species, including benthic macro invertebrates. These values are established at very low levels, and background concentrations (natural or anthropogenic) can be higher. Chemicals that are present at concentrations less than these screening values do not normally require additional evaluation. Chemicals were detected at concentrations greater than these screening values and indicate that risks may be present to lower-level ecological receptors (e.g., plants and insect larvae) via direct contact and ingestion of site media or uptake of site chemicals by plants. Table 3 presents the results of this initial screening.

The next level of evaluation in the ecological risk assessment is a comparison of the data to no-observed-adverse-effects levels (NOAELs). The NOAELs represent dosages to higher level ecological receptors (e.g., shrew, heron, raccoon) for which adverse impacts are not normally anticipated. For each receptor, a Hazard Quotient (HQ) is calculated based on a receptor's intake of a chemical through consumption of contaminated food and sediment, surface water, and soil. An HQ of less than 1.0 indicates that adverse effects for that receptor would not be expected. The results of this evaluation are summarized on the following table and indicate that risks may be present to terrestrial (land-based) animals via direct contact with sediment, surface water, and soil and ingestion of soil, sediment, surface water, and prey. Additionally, risks may be present to aquatic (water-based) animals via direct contact with sediment and surface water and ingestion of sediment, surface water, and prey.

Site Risk Summary

The human health and ecological risk assessments conclude that risks exist from human and ecological contact with site soil, sediment, sediment waste, and groundwater. Consequently, it is the Navy's, U.S. EPA's and State's belief that the preferred alternative identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to protect public health or welfare and the environment from actual or threatened releases of hazardous substances into the environment or from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

Receptor	Risk Estimates	Exposure Route
Terrestrial and Aquatic Plants, Soil Invertebrates, Benthic Receptors	U.S. EPA Region 4 Screening Levels; HQs for surface soil (max = 498), sediment (max = 66.7), sediment waste (max = 60,000), groundwater (max = 2.8), and surface water (max = 1.4)	Direct contact with sediment, prey, surface water, and soil; ingestion of sediment, prey, surface water, soil, and food; and uptake by plants.
Aquatic Food Chain Receptors – Maximum Concentrations - Mink - Heron - Mummichog - Red Drum - Osprey	Food-Chain Modeling, Maximum HQs: 6008 91 225 75 101	Direct contact with sediment and surface water; ingestion of sediment, prey, and surface water
Terrestrial Food Chain Receptors – Maximum Concentrations - Shrew - Mouse - Robin - Hawk - Fox - Woodcock	Food Chain Modeling, Maximum HQs: 303 553 593 52 65 256	Direct contact with sediment, surface water, and soil; ingestion of sediment, prey, surface water, soil, and food

Use of Applicable or Relevant and Appropriate Requirements in Evaluation Process

Applicable or Relevant and Appropriate Requirements (ARARs) are Federal and state environmental requirements used to evaluate the appropriate extent of site cleanup, to scope and formulate remedial alternatives, and to control the implementation and operation of a selected remedial action. Potential chemical-, location-, and action-specific ARARs are defined in the FS/CMS for Site 12 dated May 2004. Each alternative was evaluated to chemical-, location-, and action-specific ARARs that apply to Site 12 and are presented in Section 3.0 of the FS/CMS.

What are the Clean-Up Objectives and Levels?

Using the information gathered during the investigations and the results of the baseline risk assessment, the following remedial action objectives (RAOs) were established:

- Eliminate contact with debris and impacted surface soils by human and ecological receptors.
- Eliminate the migration of chemicals of concern (COCs) from the source material (impacted soil and debris) to downgradient media (i.e., sediment, surface water, and groundwater).
- Eliminate human exposure (i.e., direct exposure to construction workers, adolescent trespassers, adolescent recreational users, adult recreational users, child residents, adult residents, and lifelong resident) to COCs in sediment and sediment waste at concentrations in excess of RGOs. RGOs take into consideration an ILCR of 1.0E-06 for individual COCs. Additionally, RGOs take into consideration an HQ of 1.0 where noncarcinogenic effects would be expected. Elimination of COCs in sediment will also address human health concerns identified from chemicals detected in surface water.
- Eliminate exposure of ecological receptors to COCs in sediment/sediment waste at concentrations greater than RGOs. The sediment RGOs take into account direct contact of COCs by macroinvertebrates and are expected to be protective of upper food-chain receptors. RGOs address risks where "low effects" may be anticipated by ecological receptors and consider site background concentrations.
- Comply with chemical-specific, location-specific, and action-specific federal and state ARARs.

The soil and sediment COCs that exceed RGOs are provided in Tables 4 and 5. The RGOs identified in Tables 4 and 5 as the selected human health RGOs and the selected ecological RGOs have been chosen as cleanup goals.

Clean-Up Alternatives for Site 12

The FS/CMS Report and this Proposed Plan present the options that the U.S. Navy considered for the cleanup of Site 12. The cleanup options, referred to as Remedial Alternatives, are different combinations of plans to restrict access and to contain, remove, or treat contamination in order to protect public health and the environment. Due to the need to impede unauthorized access to Jericho Island, Alternative 4 from the FS/CMS has been modified to include additional excavation as described previously in this Proposed Plan. This Modified Alternative 4 has been selected as the proposed remedy.

During the upcoming public comment period, MCRD Parris Island welcomes your comments on the proposed cleanup plan and on the other technical approaches that were evaluated. These cleanup alternatives are summarized below. Please consult the FS/CMS Report for more detailed information.

Based on information currently available, it is the Navy's opinion that the preferred alternative, Modified Alternative 4, provides the best balance among the other alternatives, with respect to the evaluation criteria.

TABLE 4

SELECTION OF SURFACE SOIL RGOs
FOR THE PROTECTION OF HUMAN AND ECOLOGICAL RECEPTORS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Surface Soil COCs	Maximum Concentration	Background/ Typical Facility Concentration [1]	Region 9 Residential Soil PRG [2]	Selected Human Health Sediment RGO	Region 4 ESV [3]	Selected Ecological RGO
PAHs (ug/kg)						
B(a)P Equivalents [4]	3286	NA	434[6]	434[6]	NA	NR
Total PAHs [5]	16888	NA	NA	NA	1000	1000
VOLATILES (ug/kg)						
Chloroform	7.5	NA	240	NR	1	NR
SEMIVOLATILES (ug/kg)						
Bis(2-ethylhexyl)phthalate	480	NA	35000	NR	NA	NR
Pentachlorophenol	240	NA	3000	NR	2	NR
PESTICIDES/PCBs (ug/kg)						
4,4'-DDE	43	31.6	1700	NR	2.07	31.6 [1]
INORGANICs (mg/kg)						
Antimony	8	ND	31	NR	3.5	3.5
Arsenic	50.8	1.44	0.39	1.83 [8]	10	10
Cadmium	3.2	NA	37	NR	1.6	1.6
Chromium	18.1	6.23	210	NR	10	10
Copper	189	1.52	2900	NR	40	40
Iron	99700	3920	23000	23000	200	3920 [1]
Lead	1100	12.5	400 [7]	400	50	50
Manganese	522	129	1,800	NR	100	129 [1]
Mercury	0.89	0.11	23	NR	0.1	0.1
Nickel	26.5	1.8	1600	NR	30	30
Zinc	1020	9.7	23000	NR	50	50

(1) Background/typical facility concentrations taken from Site 1 RI/RFI (TtNUS, 2000). Pesticide values are typical facility concentrations.
(2) U.S. EPA Region 9 PRG Residential Soil Table (U.S. EPA, 2000).
(3) U.S. EPA Region 4 Ecological Screening Values (U.S. EPA, 1998).
(4) B(a)P equivalents = benzo(a)anthracene (0.1) + benzo(a)pyrene (1.0) + benzo(b)fluoranthene (0.1) + benzo(k)fluoranthene (0.01) + chyrsene (0.001) + dibenzo(a,h)anthracene (1.0) + indeno(1,2,3-cd)pyrene (0.1).
(5) Total PAHs = low molecular weight PAHs + high molecular weight PAHs.
* Low molecular weight = 2-methylnaphthalene + acenaphthene + acenaphthylene + anthracene + fluorene + naphthalene + phenanthrene.
* High molecular weight PAHs = benzo(a)anthracene + benzo(a)pyrene + chyrsene + dibenzo(a,h)anthracene + fluoranthene + pyrene.
* One-half of the detection limit is used for nondetected PAHs to calculate total PAHs and B(a)P equivalents.
(6) Calculated as 7 x benzo(a)pyrene Region 9 PRG.
(7) OSWER Soil Screening Level for Residential Landuse (U.S. EPA, 1994).
(8) RGO is PRG + Background per U.S. EPA guidance.

NA = Not available.
ND = Nondetect.
NR = Not relevant.

B(a)P = Benzo(a)pyrene
ESV = ecological screening value
OSWER = Office of Solid Waste and Emergency Response
PRG = preliminary remediation goal
RGO = Remedial Goal Options

ug/kg= microgram per kilogram
mg/kg = milligram per kilogram

TABLE 5

SELECTION OF SEDIMENT RGOs
FOR THE PROTECTION OF HUMAN AND ECOLOGICAL RECEPTORS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sediment COCs	Maximum Concentration In Sediment	Maximum Concentration In Sediment Wastes	Background/ Typical Facility Sediment Concentration [1]	Region IX Residential Soil PRG [2]	Selected Site 12 Human Health Sediment RGO	Region IV ESV [3]	Selected Site 12 Ecological RGO
PAHs (ug/kg)							
B(a)P Equivalents [4]	113	ND	NA	434 [6]	NR	NA	NR
Total PAHs [5]	1878	ND	NA	NA	NR	1684	1684
SEMIVOLATILES (ug/kg)							
Bis(2-ethylhexyl)phthalate	440	10000	NA	35000	NR	182	182
Di-n-octyl phthalate	63	900	NA	1200000	NR	NA	NA
Pentachlorophenol	180	ND	NA	3000	NR	NA	NA
PESTICIDES/PCBs (ug/kg)							
4,4'-DDE	ND	520	31.6	1700	NR	2.07	31.6
4,4'-DDT	66	38	34.5	1700	NR	1.19	34.5
Alpha Chlordane	12	ND	13.9	1600 [7]	NR	0.5 [7]	NR
Arochor-1254	ND	24000	NA	220	220	NA	NR
Dieldrin	ND	6.2	ND	30	NR	0.02	0.02
Endrin	ND	1200	ND	18000	NR	0.02	0.02
Gamma Chlordane	14	ND	13.2	1600 [7]	NR	0.5 [7]	13.2
INORGANICs (mg/kg)							
Antimony	6.8	9.4	ND	31	NR	2	2
Arsenic	18.5	49.7	12.2	0.39	12.59 [9]	7.24	12.2
Cadmium	0.84	4.7	0.278	37	NR	0.676	0.676
Chromium	75	119	35.2	210	NR	52.3	52.3
Hexavelent Chromium	ND	NA	NA	30 [10]	NR	0.4	NR
Copper	113	489	10.1	2900	NR	18.7	18.7
Iron	43100	307000	21450	23000	23000	NA	NR
Lead	203	2930	20.6	400 [8]	400	30.2	30.2
Manganese	210	1480	186	1800	NR	NA	NR
Mercury	0.35	ND	0.09	23	NR	0.13	0.13
Nickel	1060	86.9	5.95	1600	NR	15.9	15.9
Silver	ND	1.2	ND	390	NR	0.733	0.733
Zinc	197	1520	45	23000	NR	124	124

(1) Background/typical facility sediment concentrations taken from Site 1 RI/RFI (TtNUS, 2000). Pesticide values are typical facility concentrations.
(2) U.S. EPA Region IX PRG Residential Soil Table (U.S. EPA, 2000).
(3) U.S. EPA Region IV Ecological Screening Values (U.S. EPA, 1998).
(4) B(a)P equivalents = benzo(a)anthracene (0.1) + benzo(a)pyrene (1.0) + benzo(b)fluoranthene (0.1) + benzo(k)fluoranthene (0.01) + chyrsene (0.001) + dibenzo(a,h)anthracene (1.0) + indeno(1,2,3-cd)pyrene (0.1).
(5) Total PAHs = low molecular weight PAHs + high molecular weight PAHs.
* Low Molecular Weight = 2-methylnaphthalene + acenaphthene + acenaphthylene + anthracene + fluorene + naphthalene + phenanthrene.
* High Molecular Weight PAHs = benzo(a)anthracene + benzo(a)pyrene + chyrsene + dibenzo(a,h)anthracene + fluoranthene + pyrene.
* If a PAH is detected, one half of the detection limit should be used for nondetected PAHs to calculate total PAHs and B(a)P equivalents.
(6) Calculated as 7 x benzo(a)pyrene Region IX PRG.
(7) Based on total chlordane.
(8) OSWER Soil Screening Level for Residential Landuse (U.S. EPA, 1994).
(9) RGO is PRG + Background per EPA guidance.
(10) Strictest value for Region IX hexavelent chromium.

NA = Not available.
ND = Nondetect.
NR = Not relevant.

B(a)P = Benzo(a)pyrene
ESV = ecological screening value
OSWER = Office of Solid Waste and Emergency Response
PRG = preliminary remediation goal
RGO = Remedial Goal Options

ug/kg= microgram per kilogram
mg/kg = milligram per kilogram

Clean-Up Alternatives

No Action

Alternative 1 – No Action: Evaluation of the no-action alternative is required by law as a basis for comparison with other alternatives. No remedial action would be taken to eliminate risks to human health and the environment. Concentrations of contaminants may eventually be reduced to clean-up levels through natural attenuation processes but no monitoring would be performed to quantify this reduction. As existing soil erosion continues, contaminant levels may actually increase in surrounding surface water and sediment. Transport of contaminants to groundwater would also continue. Mechanisms would not be in place to determine whether the alternative would comply with ARARs or achieve RAOs.

Containment

Each of the containment alternatives (Alternatives 2a, 2b, and 3) include the following:

- Excavation of the three surface debris piles and their underlying soil and sediment. Excavation would be conducted so that remaining soil and sediment concentrations would meet the RGOs for ecological and human receptors shown in Tables 4 and 5.
- Excavation of sediment in the vicinity of sample location PAI-10-SD-08 contaminated with concentrations of inorganic chemicals greater than the RGOs for ecological and human receptors.
- Consolidation of all excavated sediment within the limits of a proposed cap system in a designated area of Site 12.
- Installation of a low-permeability cap system over the consolidated and regraded surface debris, soil, and sediment.
- Use of slope stabilization and erosion controls.
- Restoration of areas where excavation was performed.
- Implementation of land-use controls for the limits of the proposed cover, long-term monitoring of the groundwater, and operation and maintenance of the cover system.

Alternatives 2a, 2b, and 3 differ in respect to how they address PAH-contaminated soils in the vicinity of sample locations PAI-10-SS-08 and PAI-012-03 (37). Alternative 2a relies on monitored natural biodegradation of these contaminated soils (i.e., PAHs would be allowed to naturally degrade over time). Alternative 2b involves a more aggressive approach that utilizes enhanced biodegradation of the soil. Examples of enhanced biodegradation activities include tilling the soil in the area of the PAH concentrations and mixing the soil with manure to aid in the degradation process. Under Alternative 3, PAH-contaminated soils would be excavated and consolidated under the low-permeability cap system.

Removal/Disposal

Alternative 4 would protect on-site humans and ecological species from exposure to all surface debris and contaminated soil and sediment. Under Alternative 4, the following activities would be performed:

- Excavation of the surface debris piles and their underlying soil and sediment that contain chemical concentrations greater than the RGOs for ecological and human receptors.
- In the vicinity of sediment sample PAI-10-SD-08, excavation of sediments with inorganic concentrations greater than the RGOs for ecological and human receptors.
- In the vicinity of soil samples locations PAI-10-SS-08 and PAI-012-03 (37), excavation of soil with PAH concentrations greater than the RGOs for ecological and human receptors.
- Excavation of the soil and waste that comprises the causeway and 1 foot of the causeway's underlying sediment.
- Transportation and disposal of soil, sediment, and surface debris to approved off-site disposal facilities.
- Restoration of areas impacted by excavation activities.

Modified Alternative 4 would include all the actions taken under Alternative 4, plus:

- Excavation and proper disposal of debris, soils and sediments from the causeway leading to the island, after which the area would be restored.

What impacts would the remedial action have on the local community?

- Alternatives 1 would not pose environmentally significant short-term effects to the neighboring off-base community.

- Under Alternatives 2a, 2b, and 3, there would be short-term effects to traffic conditions because approximately 400 truck loads of capping material would be transported to the site.
- Similarly, under Alternative 4, there would be short-term impacts to traffic conditions because 600 truck loads of waste material would be transported from the site to an appropriate disposal facility.
- The RAOs may take approximately 10 to 30 years to be achieved under Alternative 2a and up to 5 years under Alternative 2b. The RAOs would be achieved in approximately 1 year under Alternatives 3 and 4.

Next Steps

By November 30, 2005, the Partnering Team expects to have reviewed all public comments and issued a Record of Decision (ROD). The ROD will address all public comments and will include a summary of comment responses. The ROD will then be made available to the public in the information repository at the Beaufort County Public Library Headquarters. The MCRD will also announce the chosen alternative through the local news media and the community mailing list. Please use the attached form to be included on the community mailing list.

Comparison of Clean-Up Alternatives

Overall Protection of Human Health and the Environment

- Modified Alternative 4 would provide the most overall protection compared to the other alternatives. Under Alternative 4 and Modified Alternative 4 waste and contaminated soil and sediment would be removed from all identified areas of concern and disposed at an appropriate off-site facility. Modified Alternative 4 and Alternative 4 also allow for unrestricted use of the site. Modified Alternative 4 would be more protective than Alternative 4 because an additional 800 cubic yards of waste, soil, and sediment would be removed.
- Alternative 3 would be more protective than Alternatives 2a and 2b because all surface debris and contaminated soil and sediment would be contained under a cap system.
- Alternative 2a is less protective in the short term than Alternative 2b because PAHs in soil would undergo monitored natural recovery (10 to 30 years to achieve clean-up goals) which is a less aggressive approach than enhanced biodegradation (up to 5 years to achieve clean-up goals).
- Alternative 1 is not protective of human health and the environment. In addition, site risks may increase as waste materials continue to erode.

Compliance with ARARs/Waste Management Standards

- Alternative 1 would not comply with chemical-specific ARARs.
- Alternatives 2a and 2b would comply with chemical-specific ARARs in the long term; however, it may take up to 30 years to achieve PAH clean-up goals under Alternative 2a and up to 5 years to achieve PAH clean-up goals under Alternative 2b.
- Alternative 3 is expected to comply with chemical-specific ARARs upon completion of remedial activities. The consolidation of all contaminated materials under a low-permeability cap system is expected to control the source of the contamination and eliminate the transport of impacted media to groundwater and surface water.
- The excavation and off-site disposal of contaminated materials under Alternative 4 and Modified Alternative 4 are also expected to comply with chemical-specific ARARs upon completion of remedial activities. Under these alternatives, the transport of contaminants from soil, sediment, and waste to groundwater and surface water would be eliminated.
- Alternatives 2a, 2b, and 3 would attain all action-specific ARARs and waste management standards including Federal and South Carolina regulations concerning final covers for landfills; however, Alternative 1 would not meet these landfill requirements.
- Alternative 4 and Modified Alternative 4 would also attain all action-specific ARARs and comply with waste management standards.
- Alternatives 1, 2a, 2b, 3, and Modified Alternative 4 would attain all location-specific ARARs.

Long-Term Effectiveness/Source Control

- Alternative 1 would not be effective in the long term. Residual risks would remain attributable to potential exposure to surface debris and contaminated soil and sediment. Impacts to groundwater from contaminant source areas would continue. Alternative 1 would not include source control measures.
- Alternatives 2a, 2b, and 3 would be equally effective in the long term. Under all of these containment

alternatives, source control would be provided by excavating the more highly contaminated material and consolidating the material under a low-permeability cap system. The containment of the waste material would limit the infiltration of precipitation and would minimize the impact of contaminants on groundwater quality. Containment would also prevent the transport of contaminants to surface water via erosion. Although degradation of PAH concentrations in soil would be left to natural processes under Alternative 2a and promoted through active measures under Alternative 2b, attainment of the PAH RGOs would be expected in the long term. Under Alternatives 2a, 2b, and 3, there may be some uncertainty in ensuring consistent implementation of long-term monitoring and maintenance of land use controls over the long term.

- Modified Alternative 4 provides the most effective long-term remediation option and is the most effective remedy for source control. Impacted soil, sediment, and waste would be removed from all identified areas of concern at the site. Unrestricted use of the site would be allowed, and the need for long-term monitoring and land use controls would be eliminated. Alternative 4 would be less effective than Modified Alternative 4 because waste commingled with the soil and sediment of the causeway would remain. Issues related to cap system integrity (such as cap erosion during a severe storm) would not be applicable to Alternative 4 and Modified Alternative 4.

Reduction in the Toxicity, Mobility, or Volume through Treatment

- Alternatives 1, 3, and 4 would not include treatment technologies.
- For the reduction of PAHs in soils, Alternative 2a would rely on monitored natural recovery and Alternative 2b would use enhanced biodegradation.
- Approximately 2,700 cubic yards of waste material and sediment would be contained within the cap systems in Alternatives 2a and 2b. Approximately 4,300 cubic yards of soil, sediment, and waste materials would be contained within the cap system in Alternative 3. These alternatives would not reduce the toxicity or volume of the surface debris or soil and sediment contaminant concentrations other than that which would result from natural dispersion, dilution, or other attenuating factors.
- Alternative 4 and Modified Alternative 4 do not involve treatment except for what would be required to comply with land disposal restrictions. Under Alternative 4, approximately 4,300 cubic yards of surface debris, soil, and sediment would be excavated and disposed at an appropriate off-site disposal facility. Similarly, 5,100 cubic yards of contaminated media would be excavated, transported, and disposed under Modified Alternative 4.

Short-Term Effectiveness

- Alternative 1 would not pose environmentally significant short-term effects to the neighboring off-base community.
- Under Alternatives 2a, 2b, and 3, there would be short-term effects to traffic conditions because approximately 400 truck loads of cap material would be transported on site.
- Under Alternative 4, there would be short-term impacts to traffic conditions because of the 600 truckloads of waste material that would be transported from the site to an appropriate disposal facility. Similarly, 650 truckloads of material would be transported under Modified Alternative 4.
- Under Alternatives 2a, 2b, 3, and 4, vegetation within the excavation areas would be removed. Also as part of these alternatives, 1.5 acres of wetlands would be affected but then restored to natural conditions. Under Modified Alternative 4, 1.6 acres of wetlands would be affected and then restored. Measures would be conducted to minimize the impact of excavation on the salt marsh. No endangered species are known to live within the boundaries of Site 12.
- The RAOs may take approximately 10 to 30 years to be achieved under Alternative 2a and up to 5 years under Alternative 2b. The RAOs would be achieved in approximately 1 year under Alternatives 3 and 4 and Modified Alternative 4.
- Health and safety training and proper personal protection equipment usage would minimize any effects to site workers during implementation of Alternatives 1, 2a, 2b, 3, 4, and Modified Alternative 4.

Implementability

- The implementation of Alternatives 2a, 2b, 3, and 4 and Modified Alternative 4 is technically and administratively feasible. MCRD Parris Island is an active military installation; therefore, land use controls at Site 12 are easily implementable and enforceable. This evaluation criterion is not applicable to Alternative 1.

Cost

The costs of the alternatives evaluated in the FS (Alternatives 1, 2a, 2b, 3, and 4) are shown in the following table. For Alternatives 2a, 2b, and 3, costs are shown for both RCRA Subtitle C and D cover systems. The RCRA Subtitle D cover system would consist of a bottom 6-inch layer of crushed gravel, an 18-inch layer of native soil, and an upper 6-inch topsoil layer. In addition to these elements, a RCRA Subtitle C Cover system would also include a gas collection layer, a geosynthetic clay layer, and a drainage layer. A comparison of these costs indicates that Alternative 4 is the most cost-effective alternative.

State Acceptance

- South Carolina concurs with this proposed remedy.

Community

- Community acceptance will be determined based on comments received during the public comment period.

Why Do the Navy and U.S. EPA Recommend the Preferred Alternative?

It is the Navy's and EPA's judgment that the preferred alternative (Modified Alternative 4) is necessary to protect public health or welfare and the environment from actual or threatened releases of hazardous substances into the environment. Based on the information currently available, the Navy and EPA believe the preferred alternative meets the threshold criteria and provides the best balance of tradeoffs amont the other alternatives with respect to the balancing and modifying criteria. The Navy and EPA believe that the preferred alternative satisfies the statutory requirements in CERCLA Section 121(b), which states that the selected alternative be protective of human health and the environment, comply with ARARs, be cost effective, utilize permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfy the statutory preference for treatment as a principle element. Specifically, the preferred alternative would be protective of human health and the environment because:

- human and ecological contact with waste and contaminated soil would be eleminated through the removal of all contaminated material at the site.
- the migration of COCs from source areas (debris piles) would be eliminated.

The SCDHEC concurs with the preferred alternative.

	Capital Costs ($)	Operation and Maintenance Costs		30-Year Present Worth($)
		Min ($)	Max ($)	
Alternative 1	-	-	-	-
Alternative 2a				
RCRA C Cap	1,261,000	45,500	92,900	1,913,000
RCRA D Cap	1,075,000	45,500	92,900	1,728,000
Alternative 2b				
RCRA C Cap	1,434,000	45,500	192,900	2,180,000
RCRA D Cap	1,248,000	45,500	192,900	1,994,000
Alternative 3				
RCRA C Cap	1,580,000	45,500	91,500	2,227,000
RCRA D Cap	1,313,000	45,500	91,500	1,960,000
Alternative 4	1,450,000	-	-	1,450,000

These alternatives do not address waste material commingled within the soil and sediment of the causeway. Therefore, after completion of the Site 12 FS/CMS, Modified Alternative 4 was developed to include activities associated with the excavation of the causeway. The resulting cost for Modified Alternative 4 is as follows:

Alternative	Capital Costs ($)	O&M Costs	30-Year Present Worth($)
Modified Alternative 4	1,776,000	-	1,776,000

If alternatives 2a, 2b, and 3 were modified to include excavation of the causeway and incorporation of the causeway material within a cap system, their costs would be expected to increase proportionately to the increase observed by modifying Alternative 4. As a result, Modified Alternative 4 is expected to be the most cost-effective alternative.

Community Participation

What's a Formal Comment?

Formal comments are used to improve the Proposed Plan. To make a formal comment, you need to present your views during the public meeting or submit a written comment during the 60-day comment period. The public meeting will be held on August 17, 2005 at the Shell Point Elementary School, 81 Savannah Highway, Beaufort, South Carolina 29906 starting at 6:30 P.M. Written comments should be sent to

Commanding General
Marine Corps Recruit Depot
Attn: Timothy J. Harrington, NREAO
P.O. Box 19003
Parris Island, SC 29905-9003
Tel: 843-228-3423

email: timothy.j.harrington@usmc.mil

AND

South Carolina Department of Health
and Environmental Control
Division Director John Litton
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201
Tel: 803-896-4172

email: littonjt@dhec.sc.gov

The MCRD Parris Island and Navy will review the transcript of all comments received at the public meeting and all written comments received during the formal comment period before making a final decision. They will then prepare a written response to all comments. The transcript of comments and the MCRD Parris Island and Navy's written responses will then be issued in a document called the Community Responsiveness Summary, which is part of the ROD.

For More Detailed Information

To help the public understand and comment on the proposal for the site, this document summarizes a number of reports and studies. The technical and public information publications prepared to date for Site 12 are available at the following information repository:

Beaufort County Public Library Headquarters
311 Scott Street
Beaufort, South Carolina 29902

ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
COC	Chemicals of Concern
COPC	Chemical of Potential Concern
FS	Feasibility Study
HI	Hazard Index
HQ	Hazard Quotient
ILCR	Incremental Lifetime Cancer Risk
IR	Installation Restoration
MCRD	Marine Corps Recruit Depot
Navy	Department of the Navy
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NOAEL	No-Observed-Adverse-Effect Level
NPL	National Priorities List
PAHs	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RFI	RCRA Facilities Investigation
RGO	Remedial Goal Options
RI	Remedial Investigation
SCDHEC	South Carolina Department of Health and Environmental Control
SWMU	Solid Waste Management Unit
U.S. EPA	United States Environmental Protection Agency

Marine Corps Recruit Depot, Parris Island
Site 12
Public Comment Sheet

Use this space to write your comments or to be included on the mailing list:

The MCRD Parris Island and the Navy want your written comments on the option under consideration for Site 12. You can use the form below to send written comments. If you have questions about how to comment, please call Tim Harrington at (843) 228-3423. This form is provided for your convenience. Please mail this form or additional sheets of written comments, postmarked no later than September 27, 2005, to

Commanding General
Marine Corps Recruit Depot
Attn: Timothy J. Harrington, NREAO
P.O. Box 19003
Parris Island, SC 29905-9003
Tel: 843-228-3423

email: timothy.j.harrington@usmc.mil

AND

South Carolina Department of Health and Environmental Control
Division Director John Litton
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201
Tel: 803-896-4172

email: littonjt@dhec.sc.gov

(Attach sheets as needed)

Mailing list additions, deletions, or changes

If you did not receive this through the mail or would like to

- ☐ be added to the site mailing list
- ☐ note a change of address
- ☐ be deleted from the mailing list
- ☐ obtain additional information concerning the Restoration Advisory Board

Comment submitted by: _____

Name: _____

Address: _____

_____

_____

please check the appropriate box and fill in the correct address information above.